Mnop GROUP, INC.

December 16, 1998

ORIGINAL

Peter Gold
Assistant Site Assessment Manager
U. S. EPA, Region 111
1650 Arch Street
Philadelphia, PA 19103-2029

Re: Your letter of November 24, 1998
Former Printed Circuits facility
1615 Manning Blvd., Bristol, Pa.

Dear Mr. Gold:

Per your letter, enclosed you'll find the following:

1. Site Investigation & Restoration Report Former Printed Circuits Facility, Levittown, Pennsylvania. Prepared for Mnop Group, Inc. by Stevens Environmental, Inc.

2. Letter from the Pennsylvania Department of Environmental Protection dated September 13, 1996 from James R. Burke, Hydrogeologist 2, Environmental Cleanup.

If you have any questions concerning the enclosed, please do not hesitate to contact me.

Sincerely,

A. D. Cino

ADC/bc

Enclosure:

829 Edgewood Road, Yardley, PA 19067-3159 • Telephone (215) 493-2676 • Fax (215) 493-4371

Pennsylvania Department of Environmental Protection
Lee Park, Suite 6010
555 North Lane
Conshohocken, PA 19428
September 13, 1996

ORIG

Southeast Regional Office

610-832-5949
Fax 610-832-6143

Mr. Anthony D. Cino
Mnop Group, Inc.
829 Edgewood Road
Yardley, PA 19067-3159

Re: Site Investigation and Restoration Report
Former Printed Circuits Facility
Bristol Township
Bucks County

Dear Mr. Cino:

The Department has reviewed the above-described report, dated August 22, 1996, which was submitted by Stevens Environmental, Inc. The report presents an historical background of environmental conditions at the property, and includes a description of the 1985 US EPA removal action. In addition to the historical background, a summary of environmental media conditions is presented, which is derived from 1995 soils and groundwater analytical data and confirmatory sampling conducted in 1996. The confirmatory sampling in 1996 was for the possible detection of Volatile Organic Compounds (VOC's) in soils, and to determine a trend in the concentrations of Trichloroethene (TCE), Tetrachloroethene (PCE) and 1,1,1 Trichloroethane (TCA) in groundwater at the property. A underground storage tank (UST) removal action was conducted in 1996 with the removal of one 1,000 gallon and one 2,000 gallon underground storage tank, associated concrete vaults, and liquid and sludge contents.

It is agreed that this property does no longer contain an on-going source of metals and VOC contamination to soils or groundwater. The groundwater data does not indicate a potential upgradient source, although volatile organic compounds have been detected in public water supply wells that are up-river from the property. The present concentrations of TCE, PCE and TCA at MW-1, although above state-wide health standards, are not expected to increase. At MW-2, the downgradient monitoring point, TCE and TCA are found to be within state-wide health standards, while PCE is in excess of the state-wide health standard, at 16 ug/l.

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The Department is aware of drinking water wells in the vicinity of the property. This information is obtained from the Bucks County Health Department records that are within the former Printed Circuits EPA Preliminary Assessment file. This is in conflict with the statements in the submitted report. The drinking water wells serve residences on Beaver Dam Road, Williams Street, and Oak Street. These wells do not appear to be in a downgradient direction from the property, based on the groundwater contours depicted on Figure 3 of this report. The nearest downgradient receptor appears to be the [redacted] (b) (9) A site-specific determination on the fate and transport of PCE in groundwater would be required to obtain a release of liability under the Land Recycling and Remediation Standards Act (Act 2). However, since there is no apparent human health threat associated with the PCE exceedance, the US EPA designation of NFRAP (No further remedial actions planned) seems to be an accurate category in regards to environmental conditions at this property. Therefore, in light of the clean closure of a suspected source area, and on the basis of available information, no further action is warranted at this property.

If the Department subsequently obtains additional information which indicates the existence of contamination caused by conditions on the property, additional site characterization and/or remediation may be warranted. This letter does not waive the power of the Commonwealth of Pennsylvania to take enforcement action for violations of law which may result from the conditions discussed in this letter.

If you have any questions regarding this matter, please feel free to contact me.

Sincerely,

James R. Burke

James R. Burke, P.G.
Hydrogeologist 2
Environmental Cleanup

cc: Stevens Environmental, Inc.
Mr. Day-Lewis
Re 30 (GJC)257-12

SITE INVESTIGATION & RESTORATION REPORT
FORMER PRINTED CIRCUITS FACILITY
LEVITTOWN, PENNSYLVANIA

Prepared for:

MNOP GROUP, INC.

AUGUST, 1996

Prepared by:

STEVENS ENVIRONMENTAL, INC.
700 Broadmoor Drive
Annapolis, Maryland 21401

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AUGUST, 1996

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STEVENS ENVIRONMENTAL, INC.
700 Broadmoor Drive
Annapolis, Maryland 21401

Craig S. Stevens, Pa P.G. No. 002300-G
Hydrogeologist & President

EXECUTIVE SUMMARY

Site investigation and restoration activities were conducted at the former Printed Circuits Facility located at 1615 Manning Boulevard in Levittown, Pennsylvania during August 1995 through June 1996. These activities were conducted to identify potential environmental problems and subsurface impacts at the subject property, and to take reasonable steps to address the environmental issues that were encountered. The ultimate objective of the environmental activities completed at the subject property is to obtain final site closure from the Pennsylvania Department of Environmental Protection (Pa DEP) under Pennsylvania's Clean Steams Act.

The following tasks were completed to accomplish the project objectives:

- Review of historical files, documentation of US EPA regulatory response actions completed at the site, and an initial site visit;
- Site-wide subsurface investigation and ground-water sampling program in August 1995;
- Underground storage tank assessment and closure program; and,
- Confirmatory soil and ground-water sampling program to address site-specific concerns in accordance with Pa DEP conditions for final site closure.

The subject property is situated on approximately 1.75 acres of land in a mixed industrial, commercial, and residential area. Printed Circuits purchased the site from Lectro Print in 1983. Both Lectro Print and Printed Circuits used the facility for the manufacture of printed circuit boards for the electronics industry. Printed Circuits discontinued operations at the subject property several years ago, and the property has been vacant since that time.

The US EPA conducted a removal action on the western property boundary between March and July 1985 to remove soils contaminated with metals and chlorinated volatile organic compounds (VOCs). These constituents were present at elevated concentrations in soils along the western property boundary, near the Williams Street right-of-way. Approximately 950 cubic yards of contaminated soil were removed from this area of the site during the removal action. Sampling of area wells by US EPA in 1985 revealed the presence of low levels of chlorinated VOCs and metals. It appears that the US EPA determined that these constituents were a ubiquitous feature in the regional water-table aquifer due to the industrialized nature of the area. ***Consequently, the subject property was classified by the US EPA as a No Further Remedial Action Planned (NFRAP) site.***

Five temporary wells (EP-1 through EP-5) were installed during August 1995 to investigate shallow soils and ground water throughout the subject property. No evidence of soils impacts were identified during completion of the wells; thus, ground-water samples only were collected at this time. The ground-water samples were submitted to GLA Laboratories in King of Prussia, Pennsylvania for the following analyses:

- Full suite of VOCs analyses using EPA Method 8240;
- Inorganic constituents including priority pollutant metals analyses (Method 3050 series), cyanide (Method 9010), and phenols (Method 9066); and
- GC/MS scan and library search for semi-VOCs using EPA Method 8270.

Water-level measurements from the temporary wells were used to determine that shallow ground-water flow at the site during August 1995 is southeasterly, toward the Delaware River. Ground-water sampling results from the temporary wells during are summarized as follows:

1. No priority pollutant metals, cyanide, or phenols were found above lab detection limits in ground water from four of the five temporary wells. Low levels of copper and phenols were found in Well EP-2 at 0.85 and 0.085 milligrams per liter (mg/l), respectively. These concentrations are below acceptable Pennsylvania and US EPA Region III standards for these compounds.

2. Low levels of semi-VOCs compounds were found in all of the temporary wells. However, these results do not appear to be indicative of a serious problem because the majority of the semi-VOCs compounds could only be tentatively identified and are not classified as Priority Pollutant compounds.

3. Low levels of chlorinated VOCs and, to a lesser extent, aromatic VOCs, were found in ground water at the site. Two of the chlorinated VOCs, trichloroethene (TCE) and tetrachloroethene (PCE) were detected at concentrations slightly above Pennsylvania's Health Based Standards.

The results of the August 1995 investigative activities were shared with Pa DEP. The Department agreed that the dissolved concentrations of chlorinated VOCs, TCE and PCE in particular, were the principal constituents of concern at the site. Both Pa DEP and US EPA Region III have acknowledged that the presence of dissolved concentrations of chlorinated VOCs in the water table above drinking water standards appears to be a regional problem near the site as a result of historical and ongoing industrial activity in the area. As a precaution, however, Pa DEP determined that confirmatory sampling of soils just above the soil/ground-water interface should be conducted at the subject property to verify that no on-site source of these VOCs is present in the subsurface. Additionally, Pa DEP personnel recommended collecting confirmatory ground-water samples from the two areas of concern to determine if dissolved concentration of TCE and PCE had changed appreciably since the August 1995 sampling. Pa DEP made the commitment to authorize the No Further Action (NFA) status desired by Mnop to obtain final site closure provided that confirmatory soil and ground-water sampling was conducted and no on-site source(s) of subsurface impacts were identified. Pa DEP also stipulated the clean closure of existing USTs at the subject property as a precondition for obtaining final site closure.

Two USTs consisting of a 1,000 and a 2,000 gallon tank were excavated and removed from service during June 1996. Two concrete vaults also were excavated and removed from the site at this

time. The two USTs were non-regulated tanks used to store effluent etching products. The contents of the tanks were sampled prior to their excavation, cleaning, and off-site disposal as scrap metal. Soil samples also were collected from the base of the UST and concrete vault excavations for chlorinated VOCs analyses. No evidence of any spillage, stained soils, or impacted water was encountered during tank closure. Soil sampling results from the tank excavations were negative, no chlorinated VOCs were measured above lab detection limits in these areas.

Two monitoring wells (MW-1 and MW-2) were installed during May 1996, and sampled on June 1996 for chlorinated VOCs. These two wells were installed adjacent to the loading dock area and the downgradient (southeast) property corner where previous sampling activities indicated the presence of TCE and PCE above state health standards. Evaluation of the sampling results from MW-1 and MW-2 revealed that TCE and PCE were still above state health standards of 0.005 mg/l. Upgradient concentrations of chlorinated VOCs at Well MW-1 increased relative to August 1995, while downgradient VOCs concentrations at MW-2 decreased nearly one order of magnitude from August 1995 (total VOCs of 0.35 mg/l in August 1995 versus 0.053 mg/l total VOCs in June 1996).

In summary, SEI determined from the site investigation activities the following four principal findings:

I. Low levels of chlorinated VOCs in ground water, TCE and PCE in particular, are the principal environmental issue of concern at the subject property. However, both Pa DEP and US EPA Region III have noted that these two compounds are a regional ground-water concern resulting from extensive historical and ongoing industrial activity in the vicinity of the subject property. ***Thus, the presence of these two VOCs in the water table at the site at concentrations slightly exceeding Pennsylvania's Health Based standards does not preclude final closure of the site for the following two reasons: 1) Pa DEP and US EPA have identified these two VOCs as a regional ground-water problem; and, 2) no on-site source of chlorinated VOCs was identified in SEI's site investigative activities.***

II. Confirmatory ground-water sampling shows that the dissolved concentrations of TCE and PCE are not increasing at the site, and appear to be decreasing in the direction of ground-water flow, as expected.

III. No evidence of chlorinated VOCs was detected in subsurface soils which would constitute an ongoing source of these compounds at the subject property.

IV. No evidence of any releases was found during tank closure activities, and VOCs analyses of soil samples from the base of the tank excavations were negative.

Based on the findings of the site investigation and restoration activities at the former Printed Circuits Property, SEI believes that no further action is warranted at this site. Pa DEP has indicated that they will grant NFA status for the subject property under Pennsylvania's Clean Streams Act, upon final review of this report to confirm that Pa DEP's preconditions for final site closure have been met, as previously described.

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1.0 INTRODUCTION AND OBJECTIVES

The ensuing report has been prepared by Stevens Environmental, Inc. (SEI) to present the results from site investigation and restoration activities conducted at the Printed Circuits Facility located at 1615 Manning Boulevard in Levittown, Pennsylvania. The site is a vacant property that was once operated as an electroplating facility. The primary goal of the investigative activities described herein is to characterize subsurface conditions and identify potential subsurface contaminants resulting from former operations at the subject property. The ultimate objective for which all site work has been designed is to obtain final site closure from the Pennsylvania Department of Environmental Protection (Pa DEP) under Pennsylvania's Clean Streams Act.

Activities conducted by SEI to achieve project goals included a review of historical project files, an initial site visit, a regulatory database search and review, and an investigation of subsurface soils and ground water. Closure of existing underground storage tanks (USTs) also was conducted and is summarized in this report. Additionally, a second phase of soil and ground-water sampling and analyses was performed to confirm results obtained from the initial sampling effort. A description of these activities is provided in this report along with a summary of the results of the investigation. ***Recommendations to obtain No Further Action (NFA) status for this property from Pa DEP are included with this document, based on available data collected by SEI during the investigation.***

1.1 Site Layout and Historical Summary

The subject property is located on approximately 1.75 acres of land; the general layout of the property is shown on Figure 1. The property is situated in a predominantly industrialized area, though approximately 1,200 people live within 1/4 to 1/2-mile of the site. No drinking water wells are located in close proximity to the site. The subject property was operated by Lectro Print, a manufacturer of circuit boards, until January of 1983, when the company was sold by Leeds and Northrup to Printed Circuits, Inc. Printed Circuits continued to manufacture printed circuit boards for the electronics industry. The subject property has been vacant for several years.

The US EPA conducted a removal action on the right of way near the western boundary of the subject property between March and July 1985 to address environmental hazards discovered in this area. A detailed review of these activities is beyond the scope of this document, though a brief overview is provided in this section. Parties interested in obtaining more information regarding the US EPA remedial response are encouraged to contact US EPA Region III directly to review all of the historical project files for this site.

Elevated concentrations of metals were discovered in soils along the Williams Street right-of-way and the western property boundary of the site during a site assessment conducted under US EPA oversight in March 1985. The principal area of soils impact extended from the Williams Street right-of-way adjacent to the loading dock area, to the northwestern property boundary near the Headley Street right-of-way (not shown). As a result, US EPA initiated a removal action and began excavating impacted soils in May 1985. Soil excavation and removal activities were completed by July 1985 after removing 950 cubic yards of contaminated soils. The excavation and stressed vegetation areas were graded and hydroseeded following removal of all impacted soils from the area.

The presence of elevated concentrations of chlorinated volatile organic compounds (VOCs) such as trichloroethene (TCE) and tetrachloroethene (PCE) was discovered during soil excavation. Residential wells in the area were sampled in May 1985 which revealed the presence of very low levels of metals and organics. US EPA determined that these low levels of inorganic and organic constituents in shallow ground water probably is a ubiquitous feature in this area as a result of historical industrial land usage patterns local to the subject property, and no further remedial action was recommended.

2.0 STATE AND FEDERAL ENVIRONMENTAL DATABASE SEARCH

SEI retained the services of BBL out of Solana Beach, CA to conduct a database search of State and Federal environmental records for properties within a 1/2-mile radius of the subject property. The BBL Report is provided as Attachment A to this letter report for your review. The following types of records were researched:

2.1 Federal Records

- Sites on the National Priorities List (NPL) which are targeted by EPA for probable long-term remedial action under the Superfund Act.
- Sites listed on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). This list is a compilation of known or suspected hazardous waste sites under investigation by EPA.
- Resource, Conservation, and Recovery Act (RCRA) large and small generators of hazardous waste.
- RCRA transporters, treatment, storage and disposal facilities.
- Release of oil and hazardous substances reported under the Emergency Response Notification System (ERNS).
- Database on the industrial release and/or transfer of toxic chemicals as noted on the Toxicity Release Inventory (TRI) System.
- Computerized network of all facilities that are regulated or tracked by the EPA through the Facility Index System, or FINDS.

2.2 State Records

- Registered underground storage tank (UST) sites and leaking UST sites.
- Pennsylvania Superfund sites.
- Database on solid waste facilities.

A total of 51 sites within a 1/2-mile radius were identified in the BBL Report; 22 of these site reportedly are located within a 1/4-mile radius of the site. Several of these adjacent sites are involved in the electronics industry and may have used similar materials that were once used by Lectro Print and Printed Circuits. Three sites on the CERCLIS database include: 1) Monarch Circuit Industries; 2) American Industries Co.; and, 3) Childers Products, Inc.; all three of these sites are located within 1/4-mile of the subject property. **The Printed Circuits Site is listed in the database as a No Further Remedial Action Planned (NFRAP) Site.**

3.0 FIELD INVESTIGATION PROGRAM

The field program consisted of three principal components, including: 1) the initial drilling and ground-water sampling task; 2) UST closure; and, 3) confirmatory soil and ground-water sampling. A description of these tasks is provided in this section.

3.1 Initial Site Investigation Program

The initial site investigation task was conducted by SEI to obtain a site-wide assessment of subsurface conditions, particularly in areas where potential environmental concerns may be present. During this initial investigative task, five soil borings were installed and converted into temporary wells at the Former Printed Circuits Facility in August 1995. An Earth Probe drilling assembly owned and operated by Walton Corporation of Newark, Delaware was used to complete the first boring (EP-1). The Earth Probe consists of an hydraulically operated assembly which drives a split-spoon core sampling device into the subsurface, creating a two- to three-inch diameter soil boring. The Earth Probe allows for the rapid collection of continuous soil samples to depths of approximately 15 or 20 feet below ground surface (bgs), and minimizes the generation of drilling cuttings. However, the Earth Probe drilling was ineffective at the subject property due to the presence of coarse sediments (gravel and cobbles). These coarse sediments inhibited the completion of the second soil boring, EP-2; therefore, a hollow-stem auger (HSA) drilling rig was mobilized on-site to complete this task. Thus, the remaining four borings (EP-2, EP-3, EP -4, and EP-5) were completed using three and one-quarter-inch inside diameter HSAs and a drilling rig owned and operated by Walton Corporation.

All five of the soil borings were completed to a depth of approximately 18 feet bgs; ground water was encountered between 13 and 15 feet bgs. Soils were screened in the field with a photoionization vapor monitor (Hnu) to measure for the presence of volatile organic compounds (VOCs); the Hnu readings were recorded onto the soil boring logs which are provided in Appendix A to this report. A Pennsylvania licensed Professional Geologist (P.G.) was on-site at all times to direct the investigation and record site conditions. SEI was prepared to collect soil samples for lab

analyses if evidence of soil contamination was observed or detected with the Hnu. No soil samples were collected during the initial phase of the site investigation because no evidence of soils contamination was detected.

Temporary wells consisting of one-inch diameter PVC casing and well screen were installed into all five borings immediately upon drilling three to four feet below the water table. Sediments brought to the surface during drilling, which consisted mostly of coarse silty-sands and gravel, were backfilled into the annular space between each temporary well and the borehole wall. The top of the PVC well casings were surveyed relative to a common site datum following completion of the wells, to enable SEI to determine ground-water elevations and the general direction of ground-water flow in the water-table aquifer. Temporary well construction details are presented in Table 1.

Ground-water samples were collected from all five of the temporary wells upon their completion. The ground-water samples were submitted to Great Lakes Analytical Laboratories (GLA) in King of Prussia, PA for the following analyses:

1) Full VOCs analyses by gas chromatography/mass spectrometry (GC/MS) using EPA Method 8240;

2) Inorganic constituents including priority pollutant metals analyses (Method 3050 series), cyanide (Method 9010), and phenols (Method 9066);

3) GC/MS scan and library search for semi-VOCs using EPA Method 8270.

Field parameters including pH, specific conductance, and temperature of the ground water were measured by SEI using a portable meter at the time of sample collection. Prior to collecting ground-water samples, water-level measurements were collected from each well to determine ground-water elevation and flow at the site. A small volume of ground water then was removed from each well prior to sampling to ensure that the well was hydraulically connected to the water-table aquifer and to remove standing water from each well. All ground-water samples were collected within 48 hours following well installation to ensure the collection of representative samples. The samples were collected using a small-diameter (less than 1-inch) PVC bailer. The bailer was thoroughly cleaned

prior to use in each well using a methanol rinse, followed by a laboratory-grade soap solution wash, and a final rinse with distilled water. A replicate sample and a field blank also were collected for quality control purposes. Water-sampling logs are provided in Appendix A while chain-of-custody documentation and laboratory certificates of analyses are provided in Appendix B

The temporary wells were removed from the ground upon completion of ground-water sampling activities. A bentonite seal was installed into the base of the former temporary wells and at ground surface to seal the borings. Additional quality control measures used during the initial site investigation task included steam cleaning of the downhole tools, drilling equipment, and split-spoon soil sampling devices.

3.2 Closure of Non-Regulated USTs

The USTs at the subject property were excavated and removed from the site by Construction Services International, Inc. (CSI) on June 3, 1996. A total of two USTs, including a 1,000 and a 2,000 gallon UST which were believed to have been formerly used as process tanks, were removed from the front of the site as shown on Figure 2. In addition, two concrete vaults located in series were removed from behind the facility, the approximate location of the vault area also is shown on Figure 2. The dimensions of the vaults were 3.5 feet wide, by 6.5 feet long by 6.5 feet deep.

The contents of the USTs/vaults were sampled prior to their removal to characterize the contents for off-site disposal. The USTs contained predominantly fluids while the vaults contained solids; both of which were believed to be non-regulated etching material formerly associated with historical operations at the subject property. Samples of these materials were collected for full TCLP analyses by Wayne Analytical Services of Royersford, Pa. Transport and disposal of the tank contents and all decontamination water was handled through Casie Protank of Franklinville, New Jersey. Copies of the sampling results and waste manifests are provided in Appendix C.

Following removal of the tank contents, the UST and vaults were excavated and removed for inspection. No evidence of spillage, corrosion, or holes were observed in the USTs and no evidence

of impacted soils or water were encountered in the tank excavations. Composite soil samples were collected from below the UST excavation and vault area for submittal to GLA laboratories. The soil samples were analyzed for halogenated VOCs, which previously had been determined to be the principal constituents of concern at the site.

The two USTs were cleaned on-site and transported to Trenton Scrap for off-site disposal as scrap material. Clean fill was transported to the site to backfill the tank excavations. Copies of all tank closure documentation and laboratory certificates of analyses are included in Appendix C.

Other site restoration activities completed concurrent to the investigative tasks and UST closure included the sealing of floor drains inside the building and refurbishing of the buildings' interior. Landscaping also was completed to enhance the visibility of the site and the building and to check for other potential areas of environmental concern not previously identified. Some of the general maintenance activities remain to be completed as of the preparation of this report; however, no further evidence of potential environmental problems have been encountered to date.

3.3 Confirmatory Soil and Ground-Water Sampling

Evaluation of results from the initial investigative task revealed the presence of VOCs in ground-water samples from two locations at the subject property, as discussed in Section 4.0 of this report. Based on these results, which were shared with Pa DEP personnel, it was agreed that confirmatory soil and ground-water sampling needed to be conducted at the two locations where dissolved concentrations of VOCs were detected. The specific objectives of this task were to determine 1) if soils immediately above the water table were impacted in the two areas of concern; and, 2) if dissolved VOC concentrations in ground water were consistent with the August 1995 results. These objectives were met by completing two monitoring wells in the areas of concern and collecting soil and ground-water samples from the two locations.

Two boreholes (SB-1 and SB-2) were completed into the water table on May 30, 1996 using a drilling rig owned and operated by Aquifer Testing and Drilling of Trenton, New Jersey. A licensed

P.G. from SEI was on-site to coordinate completion of all site work. Split-spoon samples were collected to evaluate subsurface conditions and look for the presence of potential impacts. A soil sample was collected at the soil/ground-water interface in each borehole and submitted to GLA laboratories for halogenated VOCs analyses using EPA Method 8010.

The boreholes were converted into Monitoring Wells MW-1 and MW-2 following collection of the soil samples. This was accomplished by advancing each borehole approximately 5 to 10 feet below the water table and installing two-inch diameter PVC well casing and screen. A ten-foot section of 0.020-inch size slotted well screen was installed at each location. A gavel filter pack was placed around the well screens and a bentonite seal was installed above the gravel pack. A locking protective casing was grouted around the surface of the well to protect the wells and prevent unwanted access. Well construction details for these two wells are included in Table 1. Soil boring logs and laboratory certificates of analysis are provided in Appendix D.

Monitoring Wells MW-1 and MW-2 were developed after allowing the wells to set for no less than 48 hours following installation. The wells were developed by surging and pumping the wells until sediment production from the wells was appreciably reduced. A centrifugal pump was used during development to help accomplish this. The wells also were surveyed relative to the floor of the building to determine the ground-water elevation relative to a common datum. Well survey data are included in Table 1.

Confirmatory ground-water samples were collected by SEI from Wells MW-1 and MW-2 on June 15, 1996. Water levels were measured in MW-1 and MW-2 prior to sampling to enable SEI to calculate the volume of water in each well. A disposable bailer then was used to remove between three and five volumes of water from each well. A representative ground-water sample subsequently was collected from each well for halogenated VOCs analysis by GLA laboratories. Field parameters including pH, specific conductance, and temperature were measured by SEI using portable instruments at the time of sample collection. Copies of the water sampling logs, chain-of-custody forms, and laboratory certificates of analyses are included in Appendix D.

4.0 INVESTIGATION RESULTS

Results from the field investigative tasks are presented and evaluated in this section.

4.1 Subsurface Soil Conditions

Sediments beneath the site consisted predominantly of fine to coarse sand layers with varying amounts of silt, gravel and cobbles. Discrete gravel layers with cobbles and rock fragments were encountered in several of the soil borings. A clayey-silt horizon was encountered at a depth of approximately 4 to 5 feet bgs in EP-1. Saturated conditions were observed at and just above this fine-grained sequence, potentially indicative of a localized perched horizon in this area. The loading dock ramp immediately adjacent to EP-1 contained several feet of water which could be acting as a recharge zone to create a localized perched horizon in this area, as indicated in the discussion of site ground-water flow conditions.

No evidence of appreciable soils impacts was detected throughout most of the site; Hnu headspace readings ranged from non-detect to 0.7 parts-per-million (ppm) in most of the borings with the exception of EP-4. Elevated Hnu headspace readings up to 650 ppm were observed in the upper four feet of this boring, which is located at the edge of the asphalt, near the rear entrance to the facility. SEI suspects that historical operations in this portion of the facility may have contributed to this localized zone of elevated soil-vapor readings. This limited area of soils impacts was excavated during UST closure activities, characterized, and disposed off-site in accordance with state and federal regulations.

Results from confirmatory soil sampling conducted at Boreholes SB-1 and SB-2 during May 1996 are presented in Table 2. No halogenated VOCs were found above laboratory detection limits in soils located just above the water table. In addition, no halogenated VOCs were found in soils collected beneath the USTs and concrete vaults, as shown in Table 2, confirming that no readily identifiable source of soils contamination appears to exist at the subject property.

4.2 Ground-Water Occurrence and Flow

The water table aquifer was encountered in the soil borings at a depth of approximately 10 to 15 feet bgs. The aquifer is unconfined and occurs predominantly within the medium to coarse-grained sands and gravel discussed previously. Regionally, SEI anticipates that ground-water flow near the site is east-southeast, toward the Delaware River. Locally, a perched water horizon may have been encountered at a depth of approximately 4 to 5 feet bgs, as discussed previously.

Ground-water elevations in the one-inch diameter temporary wells and two-inch diameter monitoring wells were measured on August 11, 1995 and June 15, 1996, respectively, and are presented in Table 3. The depth to ground water during August 1995 was approximately four feet greater compared to June 1996 measurements. Above-average precipitation during the fourth quarter of 1995 and first half of 1996 may be responsible for this appreciable variation in water levels at the subject property.

The inferred direction of ground-water flow during August 1995 is depicted on the flow map shown on Figure 3. Ground-water flow at the site generally is to the east-southeast, as shown on Figure 3. This southeasterly flow pattern toward the Delaware River is consistent with regional ground-water flow conditions. An area of elevated water levels exists near EP-1, which may be the result of recharge from the perched zone and/or the mounded water ponded at the base of the adjacent loading ramp. Water levels vary by 2.21 feet between EP-1 and EP-2, indicating a strong hydraulic gradient is present in August 1995, probably as a result of mounded ground water near EP-1. Review of water level elevations for June 1996 reveals a difference in water levels of only 0.18 feet between MW-1 and MW-2. The reason for this variation from August 1995 to June 1996 is not known, though it is possible that increased water levels from above-average precipitation may have negated the affects of mounded or perched ground water near the loading dock area. Despite the observed variation in water levels, ground-water flow during June 1996 appears to be southeasterly, based on available data.

4.3 August 1995 Ground-Water Quality Results

Results from the VOC, inorganic constituents, and semi-VOC scan are presented in Tables 4, 5, and 6, respectively. Low levels of chlorinated VOCs including 1,1-dichloroethane (DCA), PCE, 1,1,1-trichloroethane (TCA), and TCE were detected in ground water from Temporary Wells EP-1, EP-2, and EP-4. TCA was detected at the highest concentration (310 micrograms-per-liter (ug/l)) in Wells EP-1 and EP-2. Concentrations of the remaining chlorinated VOCs ranged from 2.6 to 40 ug/l. Total VOC concentrations in ground water ranged from 2.4 ug/l in EP-5 to 368.4 ug/l in EP-1.

The aromatic VOCs toluene, ethylbenzene, and xylenes were detected at low ug/l concentrations in one of more of the wells. However, benzene was not found above lab detection limits of 2 ug/l in ground water from any of the wells.

The distribution of dissolved concentrations of chlorinated the VOCs TCE, PCE, and TCA are depicted on Figure 4. The distribution of aromatic VOC compounds toluene, ethylbenzene, and xylenes (TEX) also were plotted on Figure 4, along with total VOCs concentrations. The three wells where nominally elevated VOC concentrations were detected (EP-1, EP-2, and EP-4) are near or downgradient from areas of the facility where residual contamination from historical operations is suspected. EP-1 is located in close proximity to the loading ramp and the former drum storage area. EP-2 is located downgradient from EP-1 and the former USTs shown on the site figures. EP-4 is located in the area where shallow impacted soils were noted by SEI during headspace analyses using the Hnu. EP-4 also is located near the former drum storage area. Nearly 90 % of the VOCs present in ground water collected from EP-4 consist of aromatic VOCs, indicating that petroleum hydrocarbon constituents appear to be the principal contaminants in this area. None of the aromatic VOCs detected in ground water from EP-4 exceed state or federal action levels.

The concentrations of dissolved PCE and TCE at the subject property exceed Pennsylvania's Statewide Health Standards. PCE was present in EP-2 at 9.0 ug/l, and TCE was present in EP-1, EP-2 and EP-4 at 40, 20, and 17 ug/l, respectively. Pennsylvania's Health Standard for both of these

VOCs is 5 ug/l. However, SEI believes that the industrialized nature of the area surrounding the subject property justifies establishment of higher site-specific standards for PCE and TCE, particularly since there are no known drinking water wells downgradient from the site.

Chloroform was the only VOC detected in the Field Blank. Chloroform is commonly found at low concentrations in water treated by chlorination, and may have been present in the distilled water used to make the Field Blank sample.

No priority pollutant metals, cyanide, or phenols were detected above detection limits in the ground-water samples from Wells EP-1, EP-3, EP-4 and EP-5, as shown in Table 5. Copper and phenols were found in Well EP-2 at 0.85 and 0.085 milligrams per liter (mg/l), respectively. These concentrations are below state and EPA Region III Risk-Based Concentrations for these constituents.

Low concentrations of semi-VOCs were detected in ground water from all of the wells, as shown in Table 6. These compounds were tentatively identified based on spectral comparison to the EPA's reference library and represent estimates only. The majority of the semi-VOCs detected could not be tentatively identified and were listed as unknowns. The only priority pollutant compounds found include bis (2-ethylhexyl) phthalate and Di-n-butyl phthalate. These compounds are components of plastic materials and may be carry-over constituents from the PVC wells and/or the PVC bailer. In general, review of these results indicates that a significant source of semi-VOC contamination does not exist at the site. Furthermore, since all of the wells contain semi-VOCs including the furthest upgradient well, it is possible that these compounds may be the result of general water-quality degradation given the large number of industrial/manufacturing sites in the area.

4.4 June 1996 Confirmation Ground-Water Quality Results

Results from the halogenated VOCs confirmation sampling event in June 1996 are presented in Table 7 and on the VOCs distribution map (Figure 4). Ground-water VOCs results for Temporary Wells EP-1 and EP-2 were included in Table 8 for comparison. The June 1996 data generally are consistent with the August 1995 results; the chlorinated VOCs TCE, PCE, TCA and DCA were

measured above detection limits at levels approximately comparable to the 1995 data. Low concentrations of the chlorinated VOCs 1,1-dichloroethene and cis 1,2-dichloroethene also were found in ground water from Well MW-2. These two VOCs are common degradation compounds associated with PCE and TCE; which would explain their presence at low concentrations in downgradient Well MW-2.

The VOCs concentration in MW-1 during June 1996 (698 ug/l) increased compared to August 1995 in EP-1 (368.4 ug/l), as shown in Table 7. The TCE concentration in upgradient Well MW-1 (87 ug/l) exceeds Pennsylvania's Health Standard of 5 ug/l during June 1996. Despite this observed increase in VOCs concentration during June 1996, they remained the same order of magnitude compared to August 1995 and are not necessarily indicative of a problem, particularly given the absence of any known, on-site source area(s). Instead, the observed variation in VOCs concentrations between August 1995 and June 1996 may reflect site variations, including: water-level fluctuations, variations in well construction methods and ground-water sampling procedures, plus changes in upgradient or background conditions. More importantly, the downgradient concentration of dissolved VOCs decreased nearly one full order of magnitude in June 1996 (53.05 ug/l) compared to August 1995 (349.4 ug/l).

The dissolved concentrations of PCE (16 ug/l) is the only VOC from downgradient Well MW-2 which exceeds Pennsylvania's Health Standard of 5 ug/l during June 1996. Thus, the dissolved TCE concentration in ground water at the site has dissipated below Pennsylvania's Health Standard of 5 ug/l by the time ground water has migrated to the southeast property boundary near MW-2, based on available data.

5.0 PRINCIPAL FINDINGS

Principal findings of the developed based on information obtained during the site investigation are as follows:

- Subsurface soils at the site consist predominantly of fine to coarse sand and gravel with varying amounts of silt and, gravel and cobbles. A clayey-silt horizon was encountered in boring EP-1 at a depth of 4 to 5 feet bgs.

- Grossly contaminated soils were not detected in any of the borings, though elevated headspace readings were recorded in shallow soils at boring EP-4. Field probing with a hand auger revealed that these potentially impacted soils were very localized and subsequently removed during general site cleanup and UST excavation activities.

- All soil samples collected from the subject property were analyzed for halogenated VOCs and no VOCs were found above laboratory detection limits. Subsurface soil sampling conducted in May 1996 from boreholes SB-1 and SB-2 confirmed that the soils at the ground-water interface, adjacent to Temporary Wells EP-1 and EP-2, are not a source of halogenated VOCs. Soil sampling results from the base of the USTs and concrete vault excavations confirm that these areas are not sources of halogenated VOCs.

- The water-table aquifer is unconfined and occurs at a depth of 10 to 15 feet bgs. Ground-water flow at the site generally is to the east-southeast, and is consistent with anticipated regional flow conditions toward the Delaware River. An area of elevated ground water was found near EP-1 during August 1995 that may be the result of a perched water horizon in this area. Additionally, surface-water ponding in the base of the adjacent loading ramp was observed and may have acted as a localized ground-water recharge zone near Well EP-1.

- No evidence of ground-water mounding was observed during June 1996 monitoring. Water levels were approximately four feet higher at the subject property in June 1996 compared to August 1995, perhaps in response to above-average precipitation.

- Low concentrations of copper and phenols were found in Well EP-2 only; no inorganics were found above detection limits in any of the remaining ground-water samples. In addition, appreciable semi-VOC contamination in ground water at the site was not detected.

- Low levels of chlorinated and aromatic VOCs were the principal constituents detected in ground water at the site. During August 1995, TCA was detected at the highest concentration of 310 ug/l in Wells EP-1 and EP-2. Total VOCs concentrations ranged from 2.4 to 368.4 ug/l at this time. Benzene was not found above detection limits in any of the ground-water samples. The VOCs PCE and TCE were detected above Pennsylvania's Health Standards of 5 ug/l for ground water in wells EP-1 and EP-2 during August 1995.

- Confirmatory ground-water sampling results from June 1996 show that low levels of chlorinated VOCs are still present in the ground water, despite the absence of any known sources at the site or in the subsurface. Chlorinated VOCs concentrations generally were higher in the upgradient area (MW-1) and nearly a full order of magnitude lower along the downgradient property boundary (MW-2) compared to August 1995 concentrations. The dissolved PCE concentration of 16 ug/l in downgradient Monitoring Well MW-2 is slightly above the Pennsylvania Health Standard of 5 ug/l as of June 1996.

- The dissolved concentrations of chlorinated VOCs in ground water at the site are believed to be residual impacts from previous activities conducted at or near the site and a result of regional industrial land-usage. Review of studies conducted by US EPA and Pa DEP reveal that the presence of low part-per-billion concentrations of these VOCs in shallow ground water reportedly is fairly common in this area due to the large number of industrial and manufacturing business located nearby. As a result, US EPA and Pa DEP have indicated that additional site-specific restoration activities to reduce the regionally observed presence of low levels of dissolved TCE and PCE in the water-table aquifer do not appear to be warranted based on available data. US EPA listed the subject property as a No Further Remedial Action Planned site following completion of the removal action in 1985. Given these conditions, SEI believes that higher site-specific standards should be allowed for these two VOCs which reflect the heavy industrial land usage proximal to the subject property and the absence of downgradient drinking water wells.

6.0 RECOMMENDATIONS

Based on site conditions and the findings of this investigation, SEI believes that no further site investigative or remedial activities are warranted. The slightly elevated VOCs concentrations in ground water are believed to be an artifact from historical operations at/near the site and from regional industrial activity. Additional investigative and remedial steps to try and reduce these levels further would not be practical nor cost effective. Furthermore, the following preconditions established with Pa DEP to ensure that this site does not represent a hazard to human health and the environment have been met:

1. Removal of known sources of potential subsurface contamination at the site. This includes closure of the USTs, concrete vaults, localized soils exhibiting elevated Hnu readings, and sealing of floor drains in the building. These activities have been satisfactorily concluded and no evidence of any source(s) of chlorinated VOCs discovered.

2. Confirm that the slightly elevated levels of VOCs found in ground-water during August 1995 have not increased appreciably and decrease in the direction of ground-water flow. The June 1996 confirmation sampling results show that the downgradient VOCs concentrations decreased nearly one-full order of magnitude.

3. Confirm that there are no "hot spots" in subsurface soils adjacent to the loading dock area (EP-1 and MW-1) and downgradient property corner (EP-2 and MW-2) which could represent a continuing source of VOCs-laden seepage into the water table. This was satisfactorily achieved by collecting soil samples in the areas of concern and beneath the USTs and concrete vaults; ALL soil sampling constituent were below laboratory detection limits.

SEI believes that all conditions established by Pa DEP as a prerequisite for issuing a No Further Action status for the former Printed Circuits Property have successfully been achieved based on the results of site investigation results and restoration activities completed to date. It is our understanding from discussions with Pa DEP that NFA status will be granted under the provisions of Pennsylvania's Clean Streams Act, contingent upon Pa DEP's final review and acceptance of this report.

TABLES

Table 1

Well Construction Details
Former Printed Circuits Facility
1615 Manning Blvd., Levittown, Pennsylvania

Well Identification	A Total Depth of Borehole (Feet BG)	B Total Depth of Temp. Well (Feet BG)	C Borehole Diameter (Inches)	D Screen Slot Size (Inches)	E MP Elev. (TOC) (Feet)
EP - 1	18	16.17	3	0.10	99.23
EP - 2	18	17.75	8	0.10	99.50
EP - 3	18	18.75	8	0.10	99.65
EP - 4	18	18.68	8	0.10	99.32
EP - 5	18	18.60	8	0.10	99.28
MW-1	20.5	20.00	8	0.20	98.94
MW-2	20	19.20	8	0.20	98.27

EP-3 - Temporary Wells constructed of 1-inch diameter PVC (Installed August 10 & 11, 1995).
MW-2 - 2-inch diameter PVC Well (Installed May 30, 1996).
(BG) - Below ground.
(TOC) - Top of casing.
(MP) - Measuring point.

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Table 2

Confirmatory Soil Sampling Results for Soil Borings and Tank Closure
Former Printed Circuits Facility
1615 Maning Blvd., Levittown, Pennsylvania

Parameter (DATE)	Soil Borings SB-1	SB-2	USTs (Jun 96)	Concrete Vaults (Jun 96)
Volatile Organic Compounds				
Bromodichloromethane	< 5.0	< 5.0	< 5.0	< 5.0
Bromoform	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	< 5.0	< 5.0	< 5.0	< 5.0
Carbon tetrachloride	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	< 25	< 25	< 25	< 25
2-Chloroethyl vinyl ether	< 5.0	< 5.0	< 5.0	< 5.0
Chloroform	< 5.0	< 5.0	< 5.0	< 5.0
Chloromethane	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	< 10	< 10	< 10	< 10
1,3-Dichlorobenzene	< 10	< 10	< 10	< 10
1,4-Dichlorobenzene	< 10	< 10	< 10	< 10
1,1-Dichloroethane	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	< 5.0	< 5.0	< 5.0	< 5.0
Total 1,2-Dichloroethene	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	< 5.0	< 5.0	< 5.0	< 5.0
cis 1,3-Dichloropropene	< 5.0	< 5.0	< 5.0	< 5.0
trans 1,3-Dichloropropene	< 5.0	< 5.0	< 5.0	< 5.0
Methylene chloride	< 10	< 10	< 10	< 10
1,1,2,2-Tetrachloroethane	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	< 10	< 10	< 10	< 10
Total VOCs	ND	ND	ND	ND

All concentrations reported in micrograms per kilogram (ug/kg), or parts-per-billion
Soils analyzed for VOCs by GC using EPA Method 8010

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Table 3
Ground-Water Elevation Data - August 11, 1995 & June 15, 1996
Former Printed Circuits Facility
1615 Maning Blvd., Levittown, Pennsylvania

Well ID	MP Elevation	Depth to Water	GW Elevation August 1995	GW Elevation June 1996
EP - 1	99.23	13.89	85.34	
EP - 2	99.50	16.37	83.13	
EP - 3	99.65	15.31	84.34	
EP - 4	99.32	15.22	84.1	
EP - 5	99.28	15.21	84.07	
MW-1	98.94	9.76		89.18
MW-2	98.87	9.87		89

All measurements presented in feet.
MP Elevation surveyed relative to arbitrary datum of 100.00 feet.

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Table 4
Volatile Organic Analytical Results in Ground Water - August 11, 1995
Former Printed Circuits Facility, Levittown, Pennsylvania

Parameter	Temporary Monitoring Well					
	EP-1	EP-2	EP-3	EP-4	EP-5	FB-1
Volatile Organic Compounds						
Acetone	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromodichloromethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromoform	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Bromomethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
2-Butanone	<10	<10	<10	<10	<10	<10
Carbon disulfide	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon tetrachloride	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chlorobenzene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chlorodibromomethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chloroethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
2-Chloroethyl vinyl ether	< 10	< 10	< 10	< 10	< 10	< 10
Chloroform	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	4.6
Chloromethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
1,1-Dichloroethane	13.0	5.0	< 2.0	< 2.0	< 2.0	< 2.0
1,2-Dichloroethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
1,1-Dichloroethene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
cis 1,2-Dichloroethene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
trans 1,2-Dichloroethene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
1,2-Dichloropropane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
cis 1,3-Dichloropropene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
trans 1,3-Dichloropropene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
2-Hexanone	< 10	< 10	< 10	25.0	< 2.0	< 2.0
Methylene chloride	< 2.0	< 2.0	< 2.0	< 10	< 10	< 10
4-Methyl-2-pentanone	< 10	< 10	< 10	< 2.0	< 2.0	< 2.0
Styrene	< 2.0	< 2.0	< 2.0	< 10	< 10	< 10
1,1,2,2-Tetrachloroethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Tetrachloroethene	< 2.0	9.0	< 2.0	< 2.0	< 2.0	< 2.0
Toluene	5.8	5.4	4.6	7.0	2.4	2.4
1,1,1-Trichloroethane	310.0	310.0	< 2.0	2.6	< 2.0	< 2.0
1,1,2-Trichloroethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	40.0	20.0	< 2.0	17.0	< 2.0	< 2.0
Trichlorofluoromethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Vinyl acetate	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Vinyl chloride	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Xylenes	< 2.0	< 2.0	4.4	100.0	< 2.0	< 2.0
Total VOCs	368.4	349.4	9.0	151.6	2.4	4.6

All concentrations reported in micrograms per liter (ug/l)
FB-1 represents the field blank sample collected by SEI
VOCs analyzed by GC/MS using EPA Method 8260

Table 5
Inorganic Constituent Results in Ground Water - August 11, 1995
Former Printed Circuits Facility, Levittown, Pennsylvania

Parameter	Temporary Monitoring Well					
	EP-1	EP-2	EP-3	EP-4	EP-5	FB-1
Metals, Cyanide, & Phenols						
Antimony	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
Arsenic	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Beryllium	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Cadmium	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chromium	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
Copper	< 0.050	0.85	< 0.050	< 0.050	< 0.050	< 0.050
Lead	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Mercury	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Nickel	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
Selenium	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Silver	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Thallium	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
Zinc	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
Cyanide	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenols	< 0.030	0.085	< 0.030	< 0.030	< 0.030	< 0.030
Field Measurements						
pH (standard units)	5.20	4.77	5.37	5.09	5.35	--
Specific Conductance	78	135	74	62	81	--
Ground - Water Elevation	85.34	83.13	84.34	84.10	84.07	--

All concentrations reported in milligrams per liter (mg/l), unless otherwise noted
FB-1 represents the field blank collected by SEI for lab analyses
Specific conductance measurements reported in micromhos per centimeter (umhos/cm)
-- Indicates not measured
Priority pollutant metals analyzed using EPA Methods 3050, 7471 (Mercury), 9010 (Cyanide) and 9066 (Phenols)

Table 6
Semi-Volatile Organics GC/MS Scan Results in Ground Water
at the Former Printed Circuits Facility on August 11, 1995
1615 Manning Blvd., Levittown, Pennsylvania

Parameter	Temporary Monitoring Well				
	EP-1	EP-2	EP-3	EP-4	EP-5
Semi-Volatile Organics *					
Unknown	15.0	8.6	40.0	11.0	50.0
Unknown	15.0	7.1	23.0	< 5.0	< 5.0
Unknown	< 5.0	< 5.0	13.0	< 5.0	< 5.0
Unknown	< 5.0	< 5.0	82.0	< 5.0	< 5.0
Unknown	< 5.0	< 5.0	17.0	< 5.0	< 5.0
Unknown	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Caprolactam	15.0	< 5.0	140.0	11.0	14.0
Glycerol trycaprylate	24.0	< 5.0	< 5.0	< 5.0	< 5.0
Bis (2-ethylhexyl) phthalate	11.0	16.0	15.0	< 5.0	< 5.0
Di-n-butylphthalate	< 5.0	< 5.0	29.0	< 5.0	44.0
Propylene Glycol	< 5.0	< 5.0	29.0	6.0	49.0
Octadecanoic acid butyl ester	< 5.0	< 5.0	15.0	< 5.0	< 5.0
Dimethylbenzene	< 5.0	< 5.0	< 5.0	7.3	< 5.0

All concentrations reported in micrograms per liter (ug/l)

* Indicates Tentatively Identified Semi-Volatile Compounds by GC/MS using EPA Method 8270 & "Open Scan" Technique

All identifications are tentative and concentrations are estimates based upon spectral comparison to the EPA NIST library

Unknown compounds could not be positively identified without specific retention time standards

Table 7
Halogenated Volatile Organic Analytical Results in Ground Water - August 11, 1995 and June 15, 1995, Former Printed Circuits Facility, Levittown, Pennsylvania

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Parameter	Monitoring Well			
(DATE)	MW-1 (Jun 96)	EP-1 (Aug 95)	MW-2 (Jun 96)	EP-2 (Aug 95)
Volatile Organic Compounds				
Bromodichloromethane	< 5.0	< 2.0	< 0.5	< 2.0
Bromoform	< 10	< 2.0	< 1.0	< 2.0
Bromomethane	< 10	< 2.0	< 1.0	< 2.0
Carbon tetrachloride	< 5.0	< 2.0	< 0.5	< 2.0
Chlorobenzene	< 5.0	< 2.0	< 0.5	< 2.0
Chloroethane	< 10	< 2.0	< 1.0	< 2.0
2-Chloroethyl vinyl ether	< 5.0	< 10	< 0.5	< 10
Chloroform	< 5.0	< 2.0	< 0.5	< 2.0
Chloromethane	< 10	< 2.0	< 1.0	< 2.0
Dibromochloromethane	< 5.0	NA	< 0.5	NA
1,2-Dichlorobenzene	< 5.0	NA	< 0.5	NA
1,3-Dichlorobenzene	< 5.0	NA	< 0.5	NA
1,4-Dichlorobenzene	< 5.0	NA	< 0.5	NA
Dichlorodifluoromethane	< 5.0	NA	< 0.5	NA
1,1-Dichloroethane	91	13.0	0.7	5.0
1,2-Dichloroethane	< 5.0	< 2.0	< 0.5	< 2.0
1,1-Dichloroethene	< 5.0	< 2.0	0.79	< 2.0
cis 1,2-Dichloroethene	< 5.0	< 2.0	0.56	< 2.0
trans 1,2-Dichloroethene	< 5.0	< 2.0	< 0.5	< 2.0
1,2-Dichloropropane	< 5.0	< 2.0	< 0.5	< 2.0
cis 1,3-Dichloropropene	< 5.0	< 2.0	< 0.5	< 2.0
trans 1,3-Dichloropropene	< 10	< 2.0	< 1.0	< 2.0
Methylene chloride	< 5.0	< 2.0	< 0.5	< 2.0
1,1,2,2-Tetrachloroethane	< 5.0	< 2.0	< 0.5	< 2.0
Tetrachloroethene	< 5.0	< 2.0	16	9.0
1,1,1-Trichloroethane	520	310.0	32	310.0
1,1,2-Trichloroethane	< 5.0	< 2.0	< 0.5	< 2.0
Trichloroethene	87	40.0	3	20.0
Trichlorofluoromethane	< 10	< 2.0	< 1.0	< 2.0
Vinyl chloride	< 10	< 2.0	< 1.0	< 2.0
Total VOCs	698	368.4	53.05	349.4

All concentrations reported in micrograms per liter (ug/l)
August 1995 VOCs analyzed by GC/MS using EPA Method 8260
June 1996 VOCs analyzed by GC using EPA Method 601

FIGURES

FIGURE 1

General Site Layout
Former Printed Circuits Facility
1615 Manning Blvd., Levittown, PA

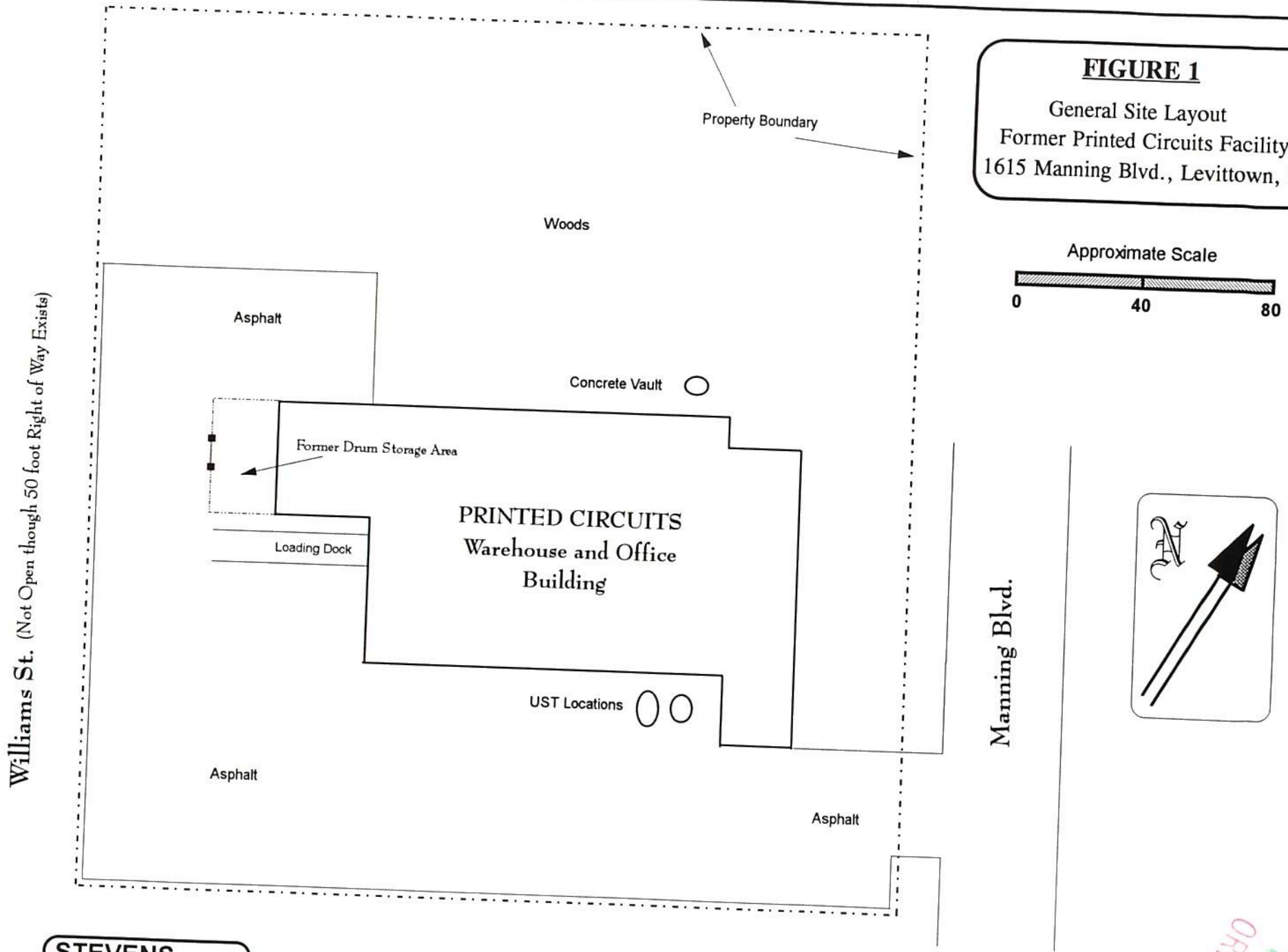

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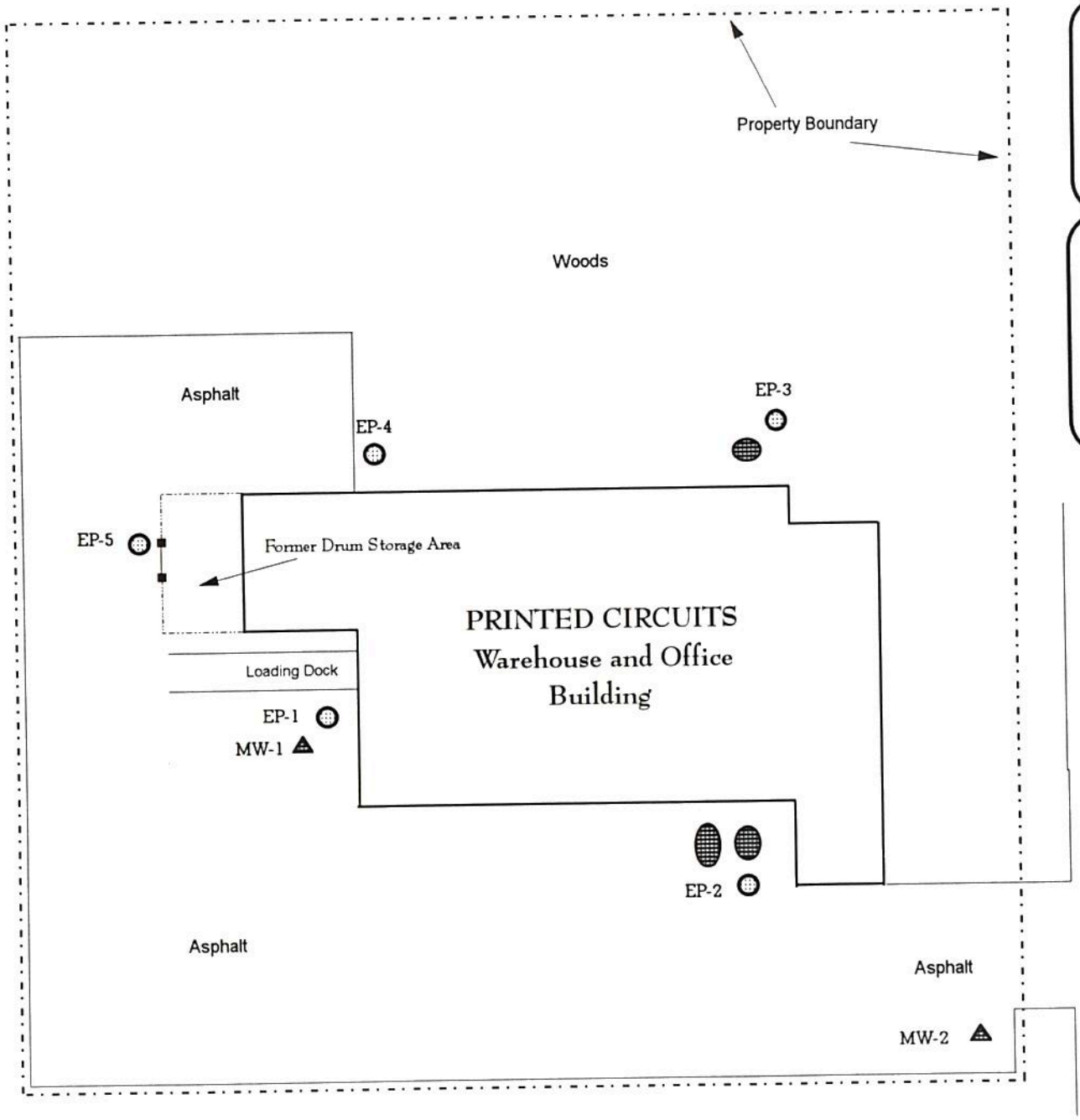
FIGURE 2

Temporary and Two-Inch PVC Wells
Former Printed Circuits Facility
1615 Manning Blvd., Levittown, PA
August 1995 and May 1996



LEGEND

EP-3 — One-inch PVC Temporary Well Location

MW-2 — Two-inch PVC Well Location

UST and Vault Locations

Approximate Scale

0 40 80

N

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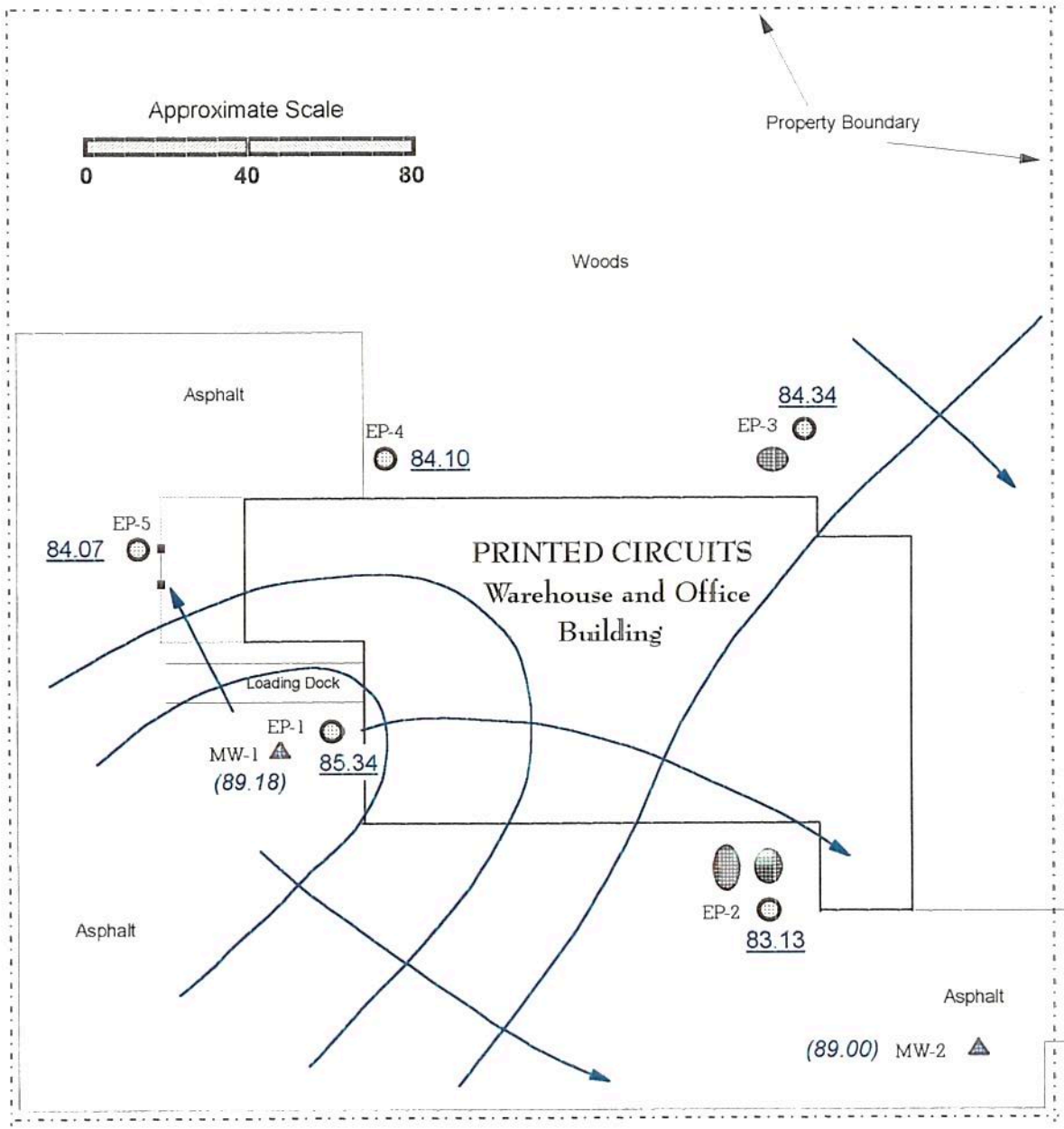
FIGURE 3

Inferred Ground-Water Flow Conditions
Former Printed Circuits Facility
1615 Manning Blvd., Levittown, PA
August 11, 1995 and June 15, 1996



LEGEND

EP-3	Temporary Well Location
MW-2	Two-Inch PVC Well Location
	Known or suspected UST Location
84.34	Ground-Water Elev. Aug 11, 1995
(89.18)	Ground-Water Elev. June 15, 1996
—85—	Ground-Water Contour Aug 11, 1995
→	Inferred Ground-Water Flow Direction on August 11, 1995

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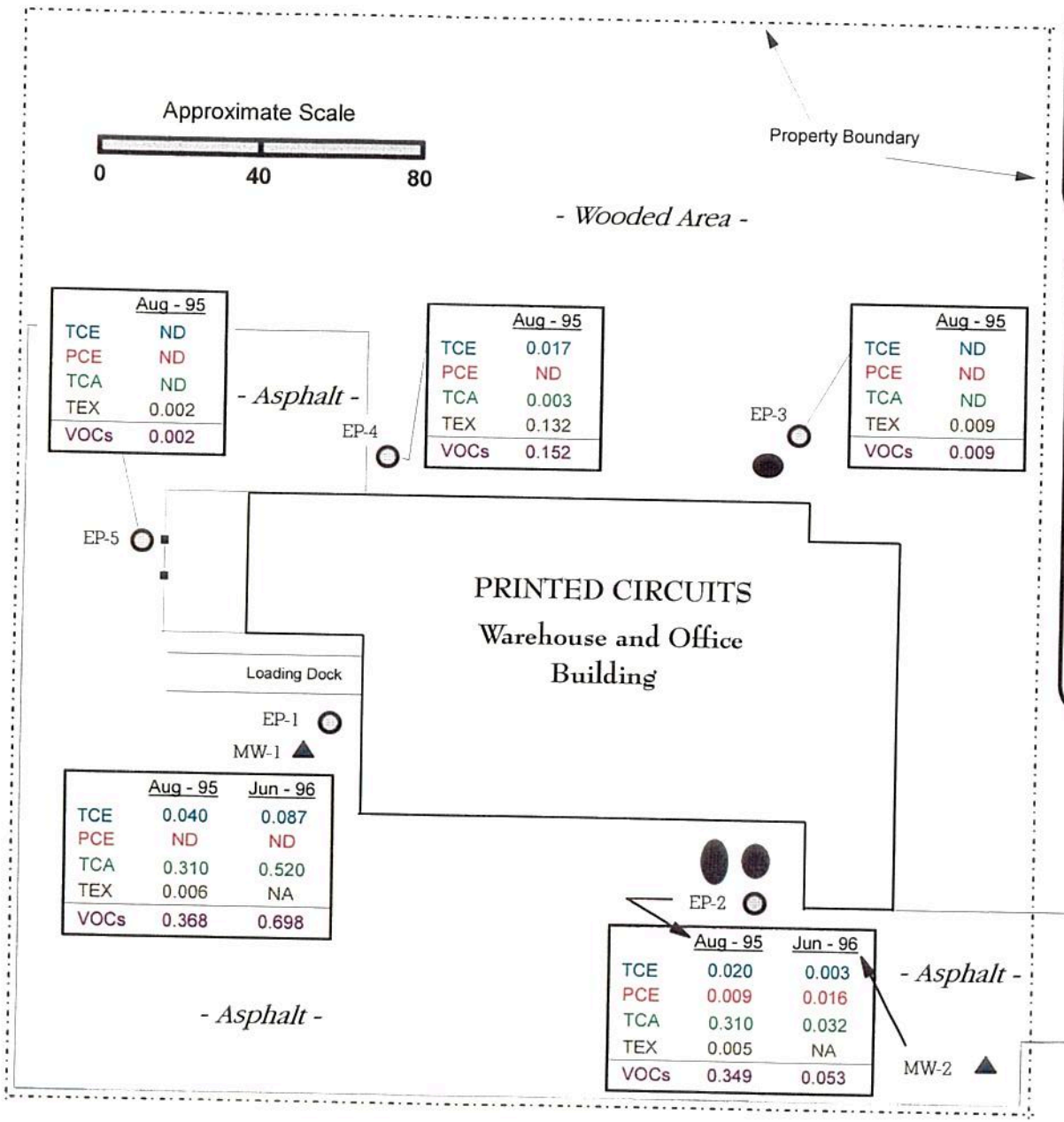
FIGURE 4

Distribution and Concentration of VOCs in Ground Water at the Former Printed Circuits Facility on 1615 Manning Blvd. Levittown, PA, August 11, 1995 and June 15, 1996



LEGEND

EP-3 ○ Temporary Well Location

MW-2 ▲ Two-Inch PVC Well Location

● UST and Vault Locations

	Aug - 95	Ground-Water Sampling Date
TCE	ND	Trichloroethene concentration
PCE	ND	Tetrachloroethene concentration
TCA	ND	1,1,1-Trichloroethane concentration
TEX	0.009	Toluene, Ethylbenzene, and Xylenes concentrations
VOCs	0.009	Total VOCs concentration

NOTES:
All concentrations reported in milligrams per liter (Mg/L) or ppm
ND = Not detected
NA = Not analyzed

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APPENDIX A

Field Documentation for August 1995 Investigation Activities

Printed Circuits Site

1615 Manning Boulevard, Levittown, PA

Earth Probe Elevations

14 August 1995

Earth Probe #	Elevation
EP-1	99.23
EP-2	99.50
EP-3	99.65
EP-4	99.32
EP-5	99.28

Based on an assumed First Floor Elevation of the existing warehouse of 100.00.

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WATER SAMPLING LOG

Project Printed Circuits Page 1 of 5
Site Location Levittown PA
Site/Well No. EP-1 Rep./FB No. — Date 8-11-95
Weather Sunny, Hot Time: Start 15:50 Finish 16:45

EVACUATION DATA

Description of Measuring Point (MP) PVC
Height of MP 0.20' MP Elevation 99.23
Total Depth 16.17 Water-Level Elev. 85.22
Depth to Water 14.01 Casing Diameter 1"
Water Column in Well 2.16 Gallons in Well ≈ 0.15 Gal
Gallons per Foot ≈ 0.07 Volume Evacuated 1 Bailer
Evacuation Method Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance Turbid
Other
Comments

Specific Conductance (umhos/cm)	79	78	78	76
pH	5.20	5.20	5.20	5.21
Temperature	66.2	→	→	→
Sampling Method	Bailer			

CONTAINER DESCRIPTION

Constituents	From Lab ✓ or SEI —	Preservative
VOCs	2 x 40mL	HCl
Metals	Plastic 500 Ml	HNO_3
Cyanide	Plastic 500 Ml	NaOH
Semi VOCs	1 Liter Glass	
Phenols	100 mL Glass	H_2SO_4

Remarks
Sampling Personnel C. Stevens

WELL CASING VOLUMES (gal/ft)

1.25" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
1.5" = 0.10	2.5" = 0.24	3.5" = 0.50	6" = 1.46

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WATER SAMPLING LOG

ORIGINAL

Project Printed Circuits Page 2 of 5
Site Location Levittown, PA
Site/Well No. EP-2 Rep./FB No. — Date 8-11-95
Weather Sunny 90° Time: Start 13:45 Finish 15:15

EVACUATION DATA

Description of Measuring Point (MP) PVC
Height of MP ____ MP Elevation 99.50
Total Depth 17.75 Water-Level Elev. 83.13
Depth to Water 16.37 Casing Diameter 1"
Water Column in Well 1.38 Gallons in Well ≈ 0.1 Gal
Gallons per Foot ≈ 0.07 Volume Evacuated 1 Bailer
Evacuation Method Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor No Appearance Turbid
Other ____
Comments ____

Specific Conductance (umhos/cm)	138	139	136	128
pH	4.76	4.77	4.76	4.77
Temperature	66.2	→	→	→
Sampling Method	Bailer			

CONTAINER DESCRIPTION

Constituents	From Lab ✓ or SEI ___	Preservative
VOCs	2 + 40 ml	HCL
Metals	Plastic 500 ML	HNO3
Cyanide	Plast. 500 ML	NaOH
Semi VOCs	1 L GL	
Phenols	100 ML GL	H2SO4

Remarks ____
Sampling Personnel C. Stevens

WELL CASING VOLUMES (gal/ft)

1.25" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
1.5" = 0.10	2.5" = 0.24	3.5" = 0.50	6" = 1.46

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WATER SAMPLING LOG

ORIGINAL

Project Printed Circuits Page 3 of 5
Site Location Levittown
Site/Well No. BP-3 Rep./FB No. FB-1 Date 8-11-95
Weather Sunny 85 Time: Start 19:10 Finish 20:30

EVACUATION DATA

Description of Measuring Point (MP) PVC
Height of MP
Total Depth 18.75 MP Elevation 99.65
Depth to Water 15.31 Water-Level Elev. 84.34
Water Column in Well 3.44 Casing Diameter 1"
Gallons per Foot 10.07 Gallons in Well 10.25
Evacuation Method Bailer Volume Evacuated 1 Bailer

SAMPLING DATA/FIELD PARAMETERS

Color DK Brown Odor NO Appearance Very Silty - Turbid
Other
Comments

Specific Conductance (umhos/cm)	73	73	74	74
pH	5.36	5.37	5.37	5.36
Temperature	58.4			
Sampling Method	Bailer			

CONTAINER DESCRIPTION

Constituents	From Lab ✓ or SEI ___	Preservative
VOCs	(4) 40 ML Glass	HCL
Metals	Plastic 500 ML	HNO_3
Cyanide	Plast. " "	NaOH
Some VOCs	1 L GL	
Phenols	100 ML GL	H_2SO_4

Remarks
Sampling Personnel C. Stevens

WELL CASING VOLUMES (gal/ft)

1.25" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
1.5" = 0.10	2.5" = 0.24	3.5" = 0.50	6" = 1.46

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WATER SAMPLING LOG

ORIGINAL

Project Printed Circuits Page 4 of 5
Site Location Levittown PA
Site/Well No. EP-4 Rep./FB No. — Date 8-11-95
Weather Sunny 90° Time: Start 18:00 Finish 18:50

EVACUATION DATA

Description of Measuring Point (MP) PVC
Height of MP
Total Depth 18.68 MP Elevation 99.32
Depth to Water ~~18.68~~ 15.27 Water-Level Elev. 84.10
Water Column in Well 3.46 Casing Diameter 1"
Gallons per Foot 0.07 Gallons in Well 0.25
Evacuation Method Bailer Volume Evacuated ± 1 Bailer (600 ml)

SAMPLING DATA/FIELD PARAMETERS

Color Dark Brown Odor No Appearance Very Turbid
Other
Comments

Specific Conductance (umhos/cm)	62	62	62	60
pH	5.09	5.08	5.09	5.08
Temperature	58.2	→	→	→
Sampling Method	Bailer			

CONTAINER DESCRIPTION

Constituents	From Lab ___ or SEI ___	Preservative
VOCs	(2) 40 ml Vials	HCl
Metals	500 ml Plast	HNO_3
Cyanide	500 ml Plast	NaOH
Semi VOCs	1 L GI	
Phenols	100 ml GI	H_2SO_4

Remarks
Sampling Personnel C. Stevens

WELL CASING VOLUMES (gal/ft)

1.25" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
1.5" = 0.10	2.5" = 0.24	3.5" = 0.50	6" = 1.46

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Environmental, Inc.

WATER SAMPLING LOG

ORIGINAL

Project Printed Circuits Page 5 of 5
Site Location Levittown PA
Site/Well No. EP-5 Rep./FB No. — Date 8-11-95
Weather Sunny 90 Time: Start 17:00 Finish 17:45

EVACUATION DATA

Description of Measuring Point (MP) PVC
Height of MP — MP Elevation 99.28
Total Depth 18.60 Water-Level Elev. 84.07
Depth to Water 15.21 Casing Diameter 4"
Water Column in Well 3.39 Gallons in Well ≈0.24
Gallons per Foot ≈0.07 Volume Evacuated 1 100 - 200 ML
Evacuation Method BAILER

SAMPLING DATA/FIELD PARAMETERS

Color DK Brown Odor NO Appearance V. Turbid, Silty
Other
Comments

Specific Conductance (umhos/cm)	80	81	81	82
pH	5.35	5.34	5.35	5.34
Temperature	60.0	→	→	→

Sampling Method Bailer

CONTAINER DESCRIPTION

Constituents	From Lab ✓ or SEI —	Preservative
VOCs	2 + 40 ML Vials	HCL
Metals	500 ML Plast	HNO_3
Cyanide	500 ML Plast	NaOH
Semi VOCs	1 L GL	
Phenols	100 ML GL	H_2SO_4

Remarks
Sampling Personnel C - Stevens

WELL CASING VOLUMES (gal/ft)

1.25" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
1.5" = 0.10	2.5" = 0.24	3.5" = 0.50	6" = 1.46

WALTON CORPORATION

Drilling Contractor
PAPER MILL ROAD — P.O. BOX 1097
NEWARK, DELAWARE 19715

Phone: (302) 737-6480
Fax: (302) 737-6309

ORIGINAL

BORING LOG

CLIENT: Stevens Environmental, Inc. PROJECT NO.

SITE: Bristol, Pennsylvania PERMIT NO.

ADDRESS:

BORING NO.	DRILLER	DATE:
EP 2	J. Foley	8/10/95
WEATHER	SURFACE ELEVATION	DATUM:

SAMPLE NO.	SAMPLE DEPTH - FEET FROM	SAMPLE DEPTH - FEET TO	DEPTH STRATA FEET FROM	DEPTH STRATA FEET TO	DRILLER'S DESCRIPTION of MATERIALS	* BLOWS A			
1	10.0	11.5			Brn Silt w/Tr (F) Sand and rock Fragments	32	32	40	
2	13.0	15.0		18.0	Same	14	13	15	12

* A Number of blows of 140lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

REMARKS:

GROUNDWATER

WALTON CORPORATION

Drilling Contractor
PAPER MILL ROAD — P.O. BOX 1097
NEWARK, DELAWARE 19715

Phone: (302) 737-6480
Fax: (302) 737-6309

ORIGINAL

BORING LOG

CLIENT: Stevens Environmental, Inc. PROJECT NO.

SITE: Bristol, Pennsylvania PERMIT NO.

ADDRESS:

BORING NO.	DRILLER	DATE:
EP 3	J. Foley	8/11/95
WEATHER	SURFACE ELEVATION	DATUM:

SAMPLE NO.	SAMPLE DEPTH - FEET FROM	SAMPLE DEPTH - FEET TO	DEPTH STRATA FEET FROM	DEPTH STRATA FEET TO	DRILLER'S DESCRIPTION of MATERIALS	* BLOWS A			
1	8.0	10.0			Brn Silt w/Little Gravel and Fragments	20	14	14	50
2	13.0	15.0		18.0	Same	10	5	7	10

* A Number of blows of 140lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

REMARKS:

GROUNDWATER

WALTON CORPORATION

Drilling Contractor
PAPER MILL ROAD — P.O. BOX 1097
NEWARK, DELAWARE 19715

Phone: (302) 737-6480
Fax: (302) 737-6309

ORIGINAL

BORING LOG

CLIENT: Stevens Environmental, Inc. PROJECT NO.

SITE: Bristol, Pennsylvania PERMIT NO.

ADDRESS:

BORING NO.	DRILLER	DATE:
EP 4	J. Foley	8/11/95
WEATHER	SURFACE ELEVATION	DATUM:

SAMPLE NO.	SAMPLE DEPTH - FEET FROM	SAMPLE DEPTH - FEET TO	DEPTH STRATA FEET FROM	DEPTH STRATA FEET TO	DRILLER'S DESCRIPTION of MATERIALS	* BLOWS A			
1	7.0	9.0			Brn Sand w/Little Gravel and Rock Fragments	35	14	24	18
2	10.0	12.0			Same	7	10	13	
3	13.0	15.0		18.0	SAme	20	5	7	5

* A Number of blows of 140lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

REMARKS:

GROUNDWATER

WALTON CORPORATION

Drilling Contractor
PAPER MILL ROAD — P.O. BOX 1097
NEWARK, DELAWARE 19715

Phone: (302) 737-6480
Fax: (302) 737-6309

ORIGINAL

BORING LOG

CLIENT: Stevens Environmental, Inc.

PROJECT NO.

SITE: Bristol, Pennsylvania

PERMIT NO.

ADDRESS:

BORING NO.	DRILLER	DATE:
EP-5	J. Foley	8/11/95
WEATHER	SURFACE ELEVATION	DATUM:

SAMPLE NO.	SAMPLE DEPTH - FEET FROM	SAMPLE DEPTH - FEET TO	DEPTH STRATA FEET FROM	DEPTH STRATA FEET TO	DRILLER'S DESCRIPTION of MATERIALS	* BLOWS A			
1	13.0	15.0		18.0	Brn Sandy Silt w/Rock Fragments	2	13	15	12

* A Number of blows of 140lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

REMARKS:

GROUNDWATER

STEVENS
Environmental, Inc.

BORING LOG

ORIGINAL

Client MNDP
Project Printed Circuits
Inspector C. Stevens
Driller Walton
Date 8/6/95 Boring EP-1 Sheet ____ of ____
Boring Depth ____ Depth to Water ____
Ground Elevation ____ Datum ____
Drilling Method Earth Probe

Sample Interval (feet)	Blow Count (6" intervals)	Recovery (inches)		HNU	DESCRIPTION
0 - 2"				0.4	ASPHALT
2" - 4"					Stone Base - Grey
4" - 2'		1'			~~Clay~~ Fill (?) silt, sand gravel mix, brown & grey, Damp
2' - 4'		1.8'		0.5	clayey silt, w/ cobbles, brown, wet to saturated
4' - 5.5'		1.5'		0.7	Same, saturated (Perched water from surface Accumulation in loading dock area?)
5.5 - 6'		6"			Med - coarse Sand, little silt, Moist, brown
6 - 8'		2'		0.4	Med - coarse Sand w/ gravel / cobble layers, brown-grey, Moist, rock looks like weathered rock with River ~~Gravel~~ chalk
8 - 10'				Neg deflection	Same, brown
10 - 12'				0	coarse Sand, Gravel lenses, Grey, Moist - wet
12 14'				0.6	Gravel & Coarse Sand w/ cobbles, brown - grey, saturated at 14'
14 - 16'				0.4	Coarse Gravel, little Sand, trace fines, saturated, brown
	CLEAN	UP BORING	TO	18'	
16 - 18'				0.4	@ Same
	END	OF BORING	-	Set	Temporary Well at 16'2"
	MP =	11 Above Asphalt			( )
	(Remove 45' of well casing from EP-1)				

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Environmental, Inc.

BORING LOG

ORIGINAL

Client MNDP
Project PRINTED CIRCUITS
Inspector CRAIG STEVENS
Driller WALTON

Date 5-10-95 Boring EP-2 Sheet 2 of
Boring Depth Depth to Water
Ground Elevation Datum
Drilling Method Earth Probe System

START HOLE AT 11:00.

Sample Interval (feet)	Blow Count (6" intervals)	Recovery (inches)		HNU	DESCRIPTION
0-2"					ASPHALT
2-4"				0.2	STONE BASE - GREY
4" - 2'					Silt, little clayey Fine Sand, some gravel, grey, damp - dry
2 - 4'				Jag neg.	Fine Sandy Silt w/ gravel, brown damp
4 - 6'				Neg. Odor	Med Sand, Little-some Silt w/ cobbles brown dry damp
6 - 8'				0.1	M. Coarse Sand, trace silt, w/ Gravel lenses interspersed, brown, Damp
8 - 10'					REFUSAL
	TRIED 3	SEPARATE	ATTEMPTS -		AUGER REFUSAL Each Time
RENEW	ATTEMPT	WITH	AUGER	RIG	ON 5-11-95
10 - ~~12~~ 11.5'	32-32-40			0.2	Gravel, Cobbles & some Fine Silty Sand,
13 - 15				0.1	Variegated brown, grey & various shades Silty, Med - Coarse Sand w/ Gravel & Cobbles, brown, Saturated
					Water Table at 14 - 14.5' bgs
	DRILL TO	18'	TO SET	TEMPORARY	WELL POINT
	MP OF	WELL POINT =	27"	Above	Asphalt (~~NOT~~ E)
		DTW =	16.36	FT	below MP 12:10

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Environmental, Inc.

BORING LOG

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Client MNOP | Date 8-10-95 | Boring EP-3 | Sheet 3 of
Project PRINTED CIRCUIT | Boring Depth 6.2' | Depth to Water
Inspector CRAIG STEVENS | Ground Elevation | Datum
Driller WALTON | Drilling Method Earth Probe

Sample Interval (feet)	Blow Count (6" intervals)	Recovery (inches)		HNU	DESCRIPTION
0-2'				0	V-fine Sandy Silt, w/ occasional
					gravel layers, brown, Dry
2-4'				0	Med. Sand w/ gravel/cobble lenses,
					brown dry-damp
4-6.2'				0.1	Med-Coarse Sand w/ gravel/cobble
					lenses, brown, Damp
			AUGER REFUSAL		
RESUME DRILLING USING 3¼" Hollow Stem Augers					
8-11-95					
8-10'					Fine ⇒ coarse Sand, Little gravel &
					silt, cobbles interspersed w/in sample,
					brown with reddish-brown tint,
					dry-damp
13-15					Silty Sand And gravel w/ Cobbles
					brown saturated
DRILL TO 16 FT TO INSTALL TEMPORARY WELL POINT					

MP = 13" Above Ground surface (wood imbedded - S. corner)

DTW = 15.63 12:40

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BORING LOG

ORIGINAL

Client MNOP
Project PRINTED CIRCUITS
Inspector CRAIG STEVENS
Driller WALTON

Date 3-10-95 Boring EP-4 Sheet ____ of ____
Boring Depth 7' Depth to Water ____
Ground Elevation ____ Datum ____
Drilling Method Earth Probe

Sample Interval (feet)	Blow Count (6" intervals)	Recovery (inches)		HNU	DESCRIPTION
0 - 2'				550	V. Fine Sandy Silt w/ tr - little clay, brown, dry damp, slightly cohesive
2 - 4'				650	Silt w/ little V. Fine - Fine Sand, tr. clay, brown, v. moist
4 - 6'				60	Fine - coarse Sand w/ gravel & cobbles, grey, damp - dry
6 - 7'				55	Med Sand, trace silt, w/ gravel lens, brown, damp
~~7 - 9~~					
RESUME DRILLING ON 8-11-95 using Hollow Stem Augers					
NOTE - STRONG ODOR FROM 0-4 FT - solvent or Paint - like fumes					
7 HNU	Readings of		150 for		cuttings at ground surface
7 - 9					Med - Coarse Sand w/ gravel layers & cobbles, brown, damp
10 - 12					Med - Coarse Sand, little gravel, brown, Damp
13 - 15					Med - Coarse Sand, tr. gravel, brown Saturated
	DRILL TO 15 FT		TO	INSTALL	TEMPORARY WELL POINT
	MP =	17"	Above	Ground	(Marked w/ flat piece of wood.)
	DTW =	15.22 FT		below	MP 12'.03

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Environmental, Inc.

BORING LOG

ORIGINAL

Client MNDP
Project PRINTED CIRCUITS
Inspector CRAIG STEVENS
Driller WALTON

Date 8-10-95 Boring ER-5 Sheet ____ of ____
Boring Depth EP Depth to Water ____
Ground Elevation ____ Datum ____
Drilling Method Earth Probe

Sample Interval (feet)	Blow Count (6" intervals)	Recovery (inches)		HNU	DESCRIPTION
0-2				0	FILL (ASPHALT 0-2", STONE 2-4"
					Grey Silty clay w/ wood chips
					& Stone, Damp
2-4'				0	clayey Silt, little - trace V. fine Sand,
					DK Brown, Damp
4-6'				0	Med - Coarse Sand, brown, Damp
6-7'				0	Med - coarse Sand, tr. Silt, DK Brown,
					Damp
7-7.2'				0	Gravel Layer
7.2-8'					V. coarse Sand, Brown, Damp -
					Moist
8-10'				0	Med coarse Sand, tr. Silt,
					Gray brown, Damp - dry
		REFUSAL AT		10.2	Feet
RESUME DRILLING		ON		8-11-95	USING 3 1/4" Hollow Stem Augers
13-15'				0.2	Gravel with Some Silty Sand &
					Cobbles, brown, saturated
DRILL TO 15 FEET TO SET TEMPORARY WELL POINT					
MP OF TEMP WELL POINT = 16.75" Above Asphalt (W)					
		DTW = 15.21 Ft Below MP 12:06			